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	Madras Mean Time.	Apparent Place. R.A.	Apparent Place. P.D.	Parallax Factors. R.A.	Parallax Factors. P.D.	Comparisons.
	h m s	h m s	° ′ ″			
Jan. 22	7 25 10	23 10 20·63	131 57 40·9	+9·8455	−0·5925	5 with 12080
23	7 37 46	23 14 50·88	131 59 13·6	+9·8556	−0·5602	1 each with 12062 12080 and 12105
25	7 31 31	23 23 2·98	131 59 6·9	+9·8504	−0·5779	2 with 12123
26	7 27 28	23 26 50·92	131 58 6·6	+9·8469	−0·5884	1 each with 12105 and 12123
26	7 31 35	23 26 52·47	131 58 31·8	+9·8505	−0·5777	2 each with 12222 and 12226
28	7 14 35	23 33 52·49	131 55 46·7	+9·8355	−0·6178	5 each with 12222 and 12226
30	7 14 24	23 40 20·30	131 51 22·0	+9·8362	−0·6145	10 with 12277
31	7 9 59	23 43 18·29	131 49 15·7	+9·8328	−0·6218	3 with 12277

Madras Observatory:
1884, *Feb.* 7.

Variation in the Light of Neptune, from Nov. 29 to Dec. 14, 1883.

By Maxwell Hall.

Neptune is favourably situated for observation at present, and the telescope was directed to the planet on Nov. 27 in order to detect, if possible, any trace of colour; there were three small stars in the field of view, *Neptune*, and two stars between the eighth and ninth magnitude which we shall call *a* and *b*. Their configuration was noticed in order to identify the planet next night by its motion. On Nov. 28 the stars were observed again, when it was noticed that the brighter and following star had moved so little that its identity with the planet was considered unsatisfactory, and an accurate measure was taken. Repeating the measure on Nov. 29 the identity of the planet was clearly proved; and the delicate bluish colour observed the two previous nights duly confirmed.

This gives us the following remarkable sequence of colour of the planets, proceeding from the Earth outwards:—*Mars*, reddish; *Jupiter*, a delicate orange; *Saturn*, greenish yellow; *Uranus*, light green; and *Neptune*, slightly blue. *Uranus* is seen tinged with green in this telescope; and so indeed I saw it in the magnificent refractor of the United States Naval Observatory. When in Washington early in April 1880, Professor Asaph Hall courteously asked me to the Observatory one night, and showed me *Uranus*: the greenish hue attracted my attention at once, and the satellites *Titania* and *Oberon* appeared to be as conspicuous in that telescope as *Jupiter's* satellites are in my

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own. I would be glad to have this prismatic sequence of colour confirmed, especially with regard to *Neptune*.

Now on the night of Nov. 29 I noticed with surprise that *Neptune* had diminished in brightness and was then no brighter than the two stars *a* and *b*, which had not changed their comparative brightness. These stars have as nearly as possible the same brightness, which has been assumed to be the 8·5 magnitude; and in comparing *Neptune* with the star *a* from time to time, the difference of brightness was *estimated* in parts of a magnitude. The micrometer was applied that night, and assuming that the tabular position of *Neptune* was correct, the common App. R.A. of these two stars was $3^h\ 8^m\ 39^s$ and their App. N. Decl. were 15° 49′ 30″ and 15° 52′ 28″ respectively referred to the Equinox at date. Subsequently a diagonal prism was used to change their relative positions; but by this time *Neptune* was somewhat brighter than *a*, and I began to doubt the correctness of the observations made an hour or so earlier.

The following night was cloudy; and it was not until the night of Dec. 2 that the fact of variation was clearly proved.

Neptune was subsequently observed whenever the weather permitted, and his brightness compared with the star *a* in the same field of view. But stormy weather prevailed, the series of observations was continually broken, and certain photometric appliances could not be used; and so it was not until Dec. 15 that the *period* of variation was determined.

But that night the brightness of *Neptune* remained steady; so again on Dec. 16 and 18; that is to say, the variation had suddenly ceased.

The following table contains all the observations. The first three columns require no explanation; the next column gives in some cases the approximate hour of maximum or minimum deduced from observation by assuming a change from max. 7·5 to min. 8·5 in four hours; and by means of this column all the observations have been combined so as to give epochs of max. and min. The corresponding epochs were then computed by assuming a period of $7^h{\cdot}92$, or

$$\overset{h}{7}\ \overset{m}{55}\ \overset{s}{12},$$

and by taking Nov. $29^d\ 6^h{\cdot}9$ as the first epoch of min., or Dec. $2^d\ 10^h{\cdot}1$ as the first epoch of max., giving preference to the latter, as Kempshot is $5^h\ 11^m$ west of Greenwich, we have as the max. epoch for future reference:—

$$\text{Dec. } \overset{d}{2}\ \overset{h}{15{\cdot}3}\ \text{G.M.T.}$$

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Variation of Neptune, Nov. 29 to Dec. 14, 1883.

Local Mean Time.			*Neptune* greater than *a*.	Approx. Mag.	Epochs of Max. and Min. observed.				Epochs computed.		O—C
	d	h			h		d	h	d	h	h
Nov.	27	9·0	$\frac{1}{2}$	8·0							
	28	9·0	$\frac{1}{2}$	8·0							
	29	7·2	0	8·5		Min.	29	7·2	29	6·9	+0·3
Dec.	1	7·8	$\frac{1}{4}$	8·3		Min.	1	6·8	1	6·4	+0·4
	2	7·2	$\frac{1}{2}$	8·0	9·2						
		8·2	$\frac{1}{2}-\frac{3}{4}$	7·9	9·8	Max.	2	10·0	2	10·1	−0·1
		9·2	$\frac{3}{4}$	7·7	10·2						
		10·2	$\frac{3}{4}$	7·6	10·7						
		16·2	$\frac{1}{4}-\frac{1}{2}$	8·1		Min.	2	14·6	2	14·1	+0·5
	4	6·0	$\frac{1}{2}$	8·0	8·0	Max.	4	8·9	4	9·7	−0·8
		7·0	$\frac{1}{2}-\frac{3}{4}$	7·9	8·6						
		9·2	$\frac{3}{4}$	7·7	10·2						
	6	5·8	$\frac{3}{4}$	7·7	6·8	Max.	6	7·5	6	9·2	−1·7
		8·2	1	7·5	8·2						
	7	6·2	$\frac{1}{2}$	8·0	8·2	Max.	7	8·7	7	8·9	−0·2
		8·8	1	7·5	8·8						
		10·0	$\frac{3}{4}$	7·7	9·0						
		14·1	$\frac{1}{4}$	8·3		Min.	7	13·1	7	12·9	+0·2
	8	7·5	$\frac{1}{2}-\frac{3}{4}$	7·9		Max.	8	9·1	8	8·7	+0·4
	9	6·2	$\frac{1}{2}$	8·0	8·2	Max.	9	8·7	9	8·5	+0·2
		9·2	$\frac{3}{4}-1$	7·6	9·2*						
	10	7·2	$\frac{3}{4}$	7·7		Max.	10	8·2	10	8·2	0·0
		14·0	$\frac{1}{2}$	8·0		Min.	10	12·0	10	12·2	−0·2
	12	6·2	$\frac{1}{2}-\frac{3}{4}$	7·9	7·8	Max.	12	8·0	12	7·7	+0·3
		8·2	$\frac{3}{4}-1$	7·6	8·2†						
	14	9·0	$\frac{1}{2}-\frac{3}{4}$	7·9		Max.	14	7·4	14	7·3	+0·1
		13·5	$\frac{1}{2}-\frac{3}{8}$	8·1		Min.	14	11·9	14	11·2	+0·7
	15	6·0	$\frac{3}{8}$	8·1							
		8·5	$\frac{1}{4}-\frac{1}{2}$	8·1							

The differences between observation and computation given in the last column are small, excepting indeed on Dec. 6, when a difference of $1^{h}\cdot 7$ occurs; but from the difficulties encountered in making the observations, and the varying effects of cloud, twilight, and moonlight, the work taken as a whole is much better than anticipated before the period was determined.

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* 8·7 or 9·7; 9·2 adopted.

† 7·7 or 8·7; 8·2 adopted.

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Respecting the cause of this variation, the planet may be assumed to have dark belts on its surface similar to the belts of *Jupiter* and *Saturn*; should these belts break up so as to make one hemisphere darker than the other, the effect of axial rotation would be to produce variations in brightness above and below the mean, as observed; and then the period of variation would simply be the period of axial rotation.

Should such variations be noticed again, we could hardly assume that the positions of maximum and minimum brilliancy on the surface of the planet had remained unchanged; and therefore we could not use the preceding epochs for a more accurate determination of the period, without the greatest care at least.

It may be further remarked that the period is such that if the planet were observed night after night at nearly the same hour, the variations would escape notice under ordinary circumstances; and this allows us to assume that variations have occurred before, and will occur again; so that a watch should be kept upon the planet at hours differing from night to night.

Kempshot Observatory, Jamaica:
1883, *Dec.* 22.

Observations of the Occultation of Venus by the Moon, made at the Royal Observatory, Greenwich, 1884, *February* 29.

(*Communicated by the Astronomer Royal.*)

	Phenomenon.	Telescope.	Power.	Moon's Limb.	Mean Solar Time of Observation.			Obs.
					h	m	s	
(*a*)	Disapp. First contact	Simms Eq.	178	Dark	3	2	50 12	W.C.
(*b*)	,,	S.E. Eq.	220	,,	3	2	51·19	M.
(*c*)	Last contact	Simms Eq.	178	,,	3	3	18·12	W.C.
(*d*)	,,	S.E. Eq.	220	,,	3	3	13·53	M.

Notes.

(*a*) The time for first contact is probably accurate within one or two seconds. A decided piece had been cut off the *s.p.* (bright) limb of *Venus* at 3^s after the time noted, when I looked at the chronometer to verify the count of seconds.

(*c*) The time for last contact is, I think, accurate within 1^s. The time noted is that at which the last minute point of light had certainly disappeared—it was distinctly seen up to 1^s before the time noted, and all was over 1^s after, when I looked at the chronometer to verify the count. The Moon's dark limb was not seen, but the bright limb was easily visible, though very much fainter than *Venus*.

Clouds covered the sky till within 2^m or 3^m of the time of first contact, leaving only just time enough to get the planet into the field. W.C.

(*b*) Immediately before first contact, the chronometer was looked at in order to begin a new count, and on looking into the telescope again it was